I claim:

1. A method for compensating for polarization mode dispersion in an optical fiber communication system, comprising the steps of:

reducing said polarization mode dispersion using a cascade of all-pass filters; and

adjusting coefficients of said all-pass filters using a least mean square algorithm.

2. The method of claim 1, wherein said cascade of all-pass filters comprises a two-channel structure consisting of multiple cascades of all-pass filters and directional couplers.

3. The method of claim 1, wherein said coefficient values are adjusted to minimize a cost function.

4. The method of claim 1, further comprising the step of measuring said polarization mode dispersion in a received optical signal.

5. The method of claim 4, wherein said measuring step employs a tunable narrowband optical filter to render information from energy detector measurements.

6. The method of claim 1, wherein said least mean square algorithm adjusts said coefficients as follows:

$$\mathrm{w}(n+1) = \mathrm{w}(n) - \mu\nabla(J),$$

where w is a composite coefficient vector defined as:

$$\mathrm{w} = \begin{bmatrix} \mathrm{a} \\ \mathrm{b} \end{bmatrix}, \quad \nabla(J) \equiv \begin{bmatrix} \frac{\partial J}{\partial \mathrm{a}^T} \frac{\partial J}{\partial \mathrm{b}^T} \end{bmatrix}^T$$

is the $(P+Q)\times 1$ complex gradient of J with respect to w, and

$$\frac{\partial J}{\partial \mathrm{a}^T} \equiv \begin{bmatrix} \frac{\partial J}{\partial a_1} & \frac{\partial J}{\partial a_2} & \cdots & \frac{\partial J}{\partial a_P} \end{bmatrix}, \text{ and}$$

$$\frac{\partial J}{\partial \mathrm{b}^T} \equiv \left[\frac{\partial J}{\partial b_1} \quad \frac{\partial J}{\partial b_2} \quad \cdots \quad \frac{\partial J}{\partial b_Q} \right].$$

7. A method for compensating for polarization mode dispersion in an optical fiber communication system, comprising the steps of:

reducing said polarization mode dispersion using a cascade of all-pass filters; and

adjusting coefficients of said all-pass filters using a Newton algorithm.

8. The method of claim 7, wherein said cascade of all-pass filters comprises a two-channel structure consisting of multiple cascades of all-pass filters and directional couplers.

9. The method of claim 7, wherein said coefficient values are adjusted to minimize a cost function.

10. The method of claim 7, further comprising the step of measuring said polarization mode dispersion in a received optical signal.

11. The method of claim 10, wherein said measuring step employs a tunable narrowband optical filter to render information from energy detector measurements.

12. The method of claim 7, wherein said Newton algorithm adjusts said coefficients as follows:

$$\mathrm{w}(n+1) = \mathrm{w}(n) - \mu \mathrm{H}^{-1} \nabla(J)$$

where w is a composite coefficient vector defined as:

$$\mathrm{w} = \begin{bmatrix} \mathrm{a} \\ \mathrm{b} \end{bmatrix}, \ \nabla(J) \equiv \left[\frac{\partial J}{\partial \mathrm{a}^T} \frac{\partial J}{\partial \mathrm{b}^T} \right]^T$$

$\frac{\partial J}{\partial \mathrm{a}^T} \equiv \left[\frac{\partial J}{\partial a_1} \quad \frac{\partial J}{\partial a_2} \quad \cdots \quad \frac{\partial J}{\partial a_P} \right]$, is the $(P+Q) \times 1$ complex gradient of J with respect to w, a Hessian matrix, H, is defined as follows:

$$H = \frac{\partial^2 J}{\partial \mathbf{w} \partial \mathbf{w}^T} = \begin{bmatrix} \frac{\partial^2 J}{\partial \mathbf{a} \partial \mathbf{a}^T} & \frac{\partial^2 J}{\partial \mathbf{a} \partial \mathbf{b}^T} \\ \frac{\partial^2 J}{\partial \mathbf{b} \partial \mathbf{a}^T} & \frac{\partial^2 J}{\partial \mathbf{b} \partial \mathbf{b}^T} \end{bmatrix} \text{ and}$$

$$\frac{\partial J}{\partial \mathbf{b}^T} \equiv \begin{bmatrix} \frac{\partial J}{\partial b_1} & \frac{\partial J}{\partial b_2} & \cdots & \frac{\partial J}{\partial b_Q} \end{bmatrix}.$$

13. A polarization mode dispersion compensator in an optical fiber communication system, comprising:

a cascade of all-pass filters having coefficients that are adjusted using a least mean square algorithm.

14. The polarization mode dispersion compensator of claim 13, wherein said cascade of all-pass filters comprises a two-channel structure consisting of multiple cascades of all-pass filters and directional couplers.

15. The polarization mode dispersion compensator of claim 13, wherein said coefficient values are adjusted to minimize a cost function.

16. The polarization mode dispersion compensator of claim 13, further comprising the step of measuring said polarization mode dispersion in a received optical signal.

17. The polarization mode dispersion compensator of claim 16, wherein said measuring step employs a tunable narrowband optical filter to render information from energy detector measurements.

18. A polarization mode dispersion compensator in an optical fiber communication system, comprising:

a cascade of all-pass filters having coefficients that are adjusted using a Newton algorithm.

19. The polarization mode dispersion compensator of claim 18, wherein said cascade of all-pass filters comprises a two-channel structure consisting of multiple cascades of all-pass filters and directional couplers.

20. The polarization mode dispersion compensator of claim 18, wherein said coefficient values are adjusted to minimize a cost function.

21. The polarization mode dispersion compensator of claim 18, further comprising the step of measuring said polarization mode dispersion in a received optical signal.

22. The polarization mode dispersion compensator of claim 21, wherein said measuring step employs a tunable narrowband optical filter to render information from energy detector measurements.